

Lesson 11 – Metallic Bonding

Metals

- Low ionization energies and low electronegativities.
- Cannot hold and attract electrons easily.

Metallic Bonding

- A type of bond that occurs between two atoms that have low ionization energies and low Electronegativities: looking at metals
- In the solid and liquid states, the valence electrons can move freely from one atom to the next: they are delocalized.
- Chemist use the electron-sea model to describe the delocalized condition:
 - Cations in a sea of moving electrons.
 - Each cation is attracted to many electrons at once.

Properties of Metallic compounds

- Solids at room temperatures (except Mercury)
 - Due to presence of strong metal to metal bonding.
 - The degree of hardness of a metallic compound varies among the metals
- High melting point and boiling points
 - Must overcome the attractive force between the delocalized electrons and the nuclei.
- Good conductors of electricity and heat
 - Due to the mobility of the electrons, energy can be transmitted rapidly.
- Malleable and ductile
 - Metal atoms are not restricted by a fixed bond, and therefore can slide over each other.
 - The extent of malleability and ductility varies among the metals.

Alloys

- Mixture of two or more different types of metals
 - Possible since the electrons in the electron-sea are attracted to any positive metal ion.
- Substitutional alloy (atoms of similar size):
 - Atoms from one metal can take the place of atoms in the other metal.
- Interstitial alloy (atoms of one metal are smaller):
 - The smaller atom fill into spaces between large atoms.